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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,908	10/03/2003	Ching-Wei Lin	10112971	2225

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EXAMINER	
EVERHART, CARIDAD	
ART UNIT	PAPER NUMBER
2891	

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	**Application No.** 10/678,908	**Applicant(s)** LIN, CHING-WEI	
	Examiner Caridad M. Everhart	**Art Unit** 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

Response to Arguments

Applicant has argued that Nitsu does not teach or suggest the passivating of polysilicon by a step of annealing using a gas which contains F, or Cl, or O2 or N2.

This argument is respectfully found to be not persuasive for the following reasons.

Nitsu teaches a thermal treatment at elevated temperature(col. 3, lines 25-33)as cited in the rejection in the previous Office Action, which is an anneal step, as an anneal step is a heating step.

With respect to the use of one of the recited gases, Nitsu teaches that fluorine is one of the atoms that can be introduced (col. 3,lines 20-23) and that this introduction can be in the vapor phase(col. 4, lines 1-4), as cited in the previous Office Action, so that the introduction can be not only implantation but also vapor introduction. The thermal treatment then passivates the polysilicon(col. 3, lines 62-67) using the atom which was introduced in the vapor phase.

Applicant has further argued that Nitsu does not teach or suggest that this is carried out in one step.

This argument is respectfully found to be not persuasive because the claim does not recite that this is carried out in one step. The claim recites “using a fluorine-containing gas...”. The anneal disclosed by Nitsu does use a fluorine-containing gas, because it is the exposure to the fluorine-containing gas which makes the anneal result in the passivation of the polysilicon, as disclosed in col. 3,lines 62-67 “the atom is combined with a silicon atom having a dangling bond existing on the crystal grain interface of polysilicon by the thermal treatment, and the dangling bond of the silicon atom can thus be passivated".

Applicant has further argued that Tran teaches hydrogen passivation.

This argument is respectfully found not to be persuasive because Tran discloses nitrogen(col. 4, lines 45-51) , and the claim requires a nitrogen containing gas, so that this limitation is satisfied.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Niitsu (US 5,137,839).

Niitsu discloses the steps of forming a polysilicon layer(col. 3, lines 13-14), and carrying out a thermal treatment(col. 3,lines 27-28), which satisfies the limitation of an anneal step. There is introduced to the polysilicon fluorine(col. 3,lines 20-22), which can be introduced in the vapor phase (col. 4,lines 1-5) which satisfies the limitation of the exposure to a fluorine-containing gas. It is disclosed that the polysilicon is thereby passivated (col. 3, lines 40-44) because the combination of the fluorine atoms which are introduced with the dangling bonds of the polysilicon is a passivation.

Claims 1,2,4,7,8,9,11, 14, and 16-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tran, et al. (US 5,534,445).

Tran, et al disclose the formation of TFTs(col. 1, lines 15-16).

Tran, et al disclose depositing amorphous silicon(col. 4,lines 8-9, annealing in nitrogen at 620 degrees C(col. 4,lines 10-11), forming a gate dielectric(col. 4,lines 20-23). There is an anneal step in nitrogen-containing atmosphere at 400 degrees C(col. 4,lines 38-40). The anneal is a furnace anneal, so that it is at atmospheric pressure(col. 4, lines 15-17). A gate dielectric is formed(col. 4, lines 20-21), a gate is formed(col. 4,lines 25-28), and a source and drain are doped in the polysilicon layer by implantation(col. 4,lines 25-29). There is an anneal step in nitrogen-containing atmosphere which includes the activation of the source and drain, as it is disclosed by Tran, et al that the anneal improves the contact of the source and drain(col. 4,lines 40-43), which would indicate that the source and drain are activated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 6, 8, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niitsu, as applied to claim 1 above.

Niitsu does not teach the recited gases nor the formation of a thin film transistor.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used fluorine as the fluorine gas source in the invention taught by Niitsu because Niitsu teaches that vapor phase may be used, and teaches that fluorine or fluoride is used to passivate the polysilicon in the portions of Niitsu cited above and fluorine gas is a well known source of fluorine in the art.

With respect to the fact that Niitsu does not teach a thin film transistor, it would have been obvious to one of ordinary skill in the art at the time of the invention to have used the process taught by Niitsu in the formation of thin film transistors because Niitsu teaches that the dangling bonds of polysilicon are passivated and that this affects the size of the grains(col. 1,lines 35-46), which is also important in the formation of TFTs, as is well known in the art.

Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran, et al as applied to claims 1 and 8 above and further in view of Yamazaki, et al.(US 5,840,600).

Tran, et al is silent with respect to the recited pressure range.

Yamazaki, et al disclose the treatment of a TFT with NO.sub.x or with NH3(abstract and col. 13, lines 10-20 and 33-40). Yamazaki, et al further teaches that in the furnace(col. 14, lines 53-55) the pressures can be 1-15 atm, which Yamazaki, et al teaches will affect the rate of the process(col. 10, lines 22-27).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used pressure in the recited range in the process taught by Tran, et al because Yamazaki et al teaches that the pressure can be adjusted and will affect the rate of the process. In view of the teaching of Yamazaki et al the pressure is a variable of the art in the process which one of ordinary skill in the art would be able to determine.

Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by Yamaguchi et al (US 20010023091A1).

Yamaguchi et al discloses the steps of forming a polysilicon layer on a substrate (paragraph 0081 discloses forming an amorphous silicon layer which is then crystallized to form polysilicon layer). Forming a gate insulating film(paragraph 0082). Forming a gate(paragraph 0080). Doping the source and drain using the gate as a mask(Fig. 3B). Introducing fluorine of chlorine into the source and drain regions(Fig. 3C and paragraphs 0036 and 0081, in which paragraph 0081 illustrates the process step, and paragraph 0036 discloses that fluorine or chlorine can be used instead of hydrogen). It is seen in Fig. 3C and 3D that the step is before the formation of the source and drain electrodes.

Yamaguchi et al is silent with respect to passivation.

Niitsu discloses that fluorine anneal passivates the polysilicon(col. 3, lines 40-44).

It would have been obvious to one of ordinary skill in the art at the time of the invention that the process taught by Yamaguchi et al passivates the polysilicon, as taught by Niitsu.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart
CARIDAD EVERHART
PRIMARY EXAMINER

C. Everhart
10-12-2005